

SECTION 1C

Objectives

- » Explain how technology changes.
- » Describe the influence of democracy on technology in the United States.

Terms to Learn

- machine tool
- nanotechnology

Standards

- Relationships & Connections
- Cultural, Social, Economic & Political Effects
- Role of Society
- Influence on History

TECH CONNECT SCIENCE

Newton's Laws

Isaac Newton made many contributions to science, including three laws of motion.

ACTIVITY Look up these three laws in a science text and explain how they apply to transportation.

How Technology Changes

How does technology change to meet people's needs?

Throughout history, technology has helped change societies and cultures. It has influenced politics and economies. In turn, technology itself has been influenced by changes in civilization. See Table 1-A.

Building on the Past

What are some examples of today's technology that are based on pre-existing technology?

In everything we do, we build on the efforts of people who came before us. Your teachers teach you a bit more or a bit better than they were taught. We continue to build on the English language. We often add brand-new words such as *spam* (unwanted e-mail) and *blog* (Web log).

Isaac Newton was a famous British scientist during the 1700s who investigated the motion of the planets. He once said, "If I have seen further [than others], it is by standing upon the shoulders of giants." Newton didn't really stand on anyone's shoulders. He meant that his accomplishments were based on the earlier work of other people. That's something you share with Newton. Everyone builds on what came before. Sometimes knowledge or something new developed for one purpose can be used for something else. In technology, we build on the accomplishments of early artisans, mechanics, technicians, engineers, and scientists.

Technology is continually evolving, which means it is growing and changing. Thomas Edison invented phonograph records, but he knew nothing about tape recordings. Tapes have been replaced by compact disc recordings. This evolutionary process is normal and never stops. See Figure 1-10 on page 42.

Boeing 707 airplanes were designed by people who used slide rules for calculations. Today's airplanes are designed by people who use pocket calculators and desktop com-

TABLE 1-A

History of Technology

Iron Age— Beginning about 1200 B.C.E.	Iron replaced metals such as copper and bronze in tools. Iron was plentiful and its use spread over much of the known world. Iron agricultural tools made permanent farming settlements more desirable.
Middle Ages— Beginning about 500	The waterwheel, the windmill, the horse-shoe, papermaking, mechanical clocks, and faster ships were all developed during this time. All had important effects on the societies of the period.
The Renaissance— Beginning about 1300	This period saw a rebirth in the arts and humanities. Canal construction and architecture also flourished. The microscope, the telescope, and many other devices and processes were invented.
The Industrial Revolution— Beginning about 1750	Manufacturing, transportation, communication, and construction all advanced rapidly during this time. Education was improved, and people had more leisure time.
The Information Age— Beginning about 1900	This period began with the invention of machines that could process, store, and exchange data electronically. Computers and other electronic devices have brought many advances.

puters. Technology continually moves forward by adapting, so that each new product is an improvement over existing products. New technologies often create new processes as well.

For example, a new technology you might have heard about is **nanotechnology**. It is the science of working with the atoms or molecules of materials to develop very small machines. (The term comes from the word *nano*, meaning "one billionth.") Years ago noted physicist Richard Feynman predicted that we would one day be able to build

nanotechnology

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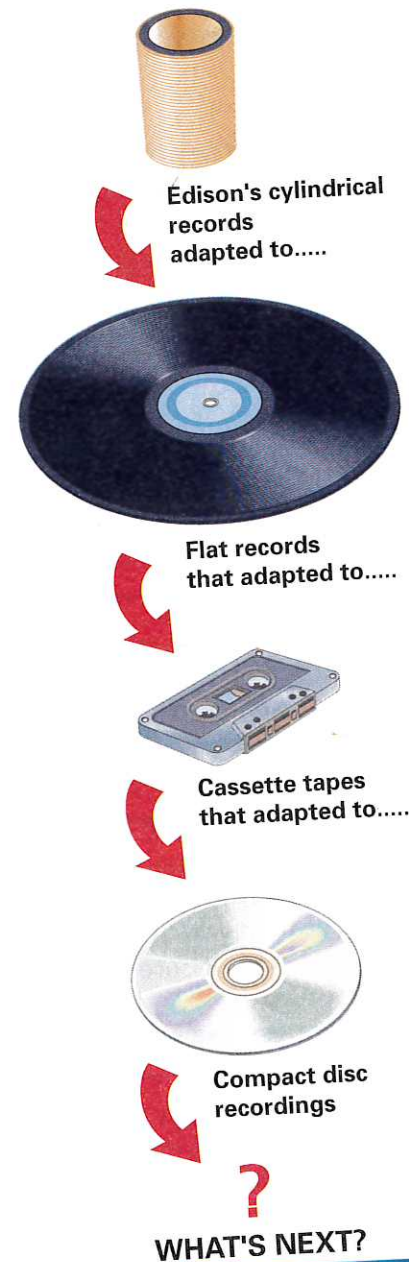


Figure 1-10 Voice and music recording media have evolved from Edison's records to today's CDs. What recording medium do you think will be popular ten years from now?

machine tool
a machine used for shaping or finishing metals and other materials

a machine so small that it would be the size of just a few thousand atoms. His prediction came true. Tiny machines can be built by assembling molecules and atoms as building blocks. They have gears so small that you need a microscope to see them. See Figure 1-11. Someday these machines may be injected into the human body or used in other places people can't normally reach.

Technology is also changing more rapidly today than ever before. One reason for this is better communication. Centuries ago, news traveled slowly. Today, information travels around the world in seconds.

Technology in the United States

What happened when technology met democracy?

Since the 1700s, this country has developed a reputation as a place where an intelligent and energetic person could be successful. During the early years, social conditions here were unlike any found in other countries. Americans had new ideas about work, community, and success. Under democracy, they felt free to try different ways of doing things. These beliefs encouraged technical advances and the establishment of businesses.

After the United States first entered the technology arena in the field of **machine tools**, many other products were developed here. Some of them include electronic computers, industrial robots, liquid-fueled rockets, reliable suspension bridges, photocopy machines, diesel engines for locomotives, electronic television, electronic flash for photography, the metal-framed skyscraper, and the practical helicopter. The heritage of American technology extends far back, and its roots are long and deep. You have benefited from and inherited a powerful technological tradition. It's up to you to continue that tradition. See Figure 1-12.

Figure 1-11 This tiny machine is so small it can be seen only with the aid of a microscope.



Figure 1-12 Through design, experimentation, and construction of models like this, you too can add to the technological tradition you have inherited.

SECTION REVIEW 1C

Recall »

1. Who was Isaac Newton?
2. With what type of product did the United States first enter the arena of technology?
3. Name five products that were originally developed in the United States.

Think »

4. Give an example from your own life of how you have built on the efforts of someone else.

5. Give an example of the evolution of a technological device.

Apply »

6. **Research** Investigate an interesting career in technology. Make a display.